

## Claims

1. A method of producing an edible plant whose edible portions comprise significant concentrations of Se-methylselenocysteine or selenium, comprising:

5 identifying a growth environment containing selenite;  
providing a crop plant characterized by an ability to accumulate Se-methylselenocysteine in its edible portions;  
cultivating the plant in the growth environment under conditions and for a time sufficient for the plant to accumulate a significant amount of Se-methylselenocysteine or selenium in its edible portions; and  
10 harvesting edible portions of the plant which comprise accumulated selenium.

2. The method of claim 1, where the growth environment contains selenite.

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3. The method of claim 1, where identifying the growth environment includes manipulating the growth environment to increase the availability of selenite to the plant.

4. The method of claim 3, where manipulating the growth environment includes adding selenite to the growth environment.

5. The method of claim 1, where the plant is a member of the family *Brassicaceae*.

6. The method of claim 5, where the plant is a member of the genus *Brassica*.

7. The method of claim 6, where the plant is member of the species *Brassica juncea*, *Brassica Oleralea*, and *Brassica Carinata*.

8. The method of claim 1, where the harvested plant is incorporated into a nutritional, supplement in a form selected from the group consisting of capsules, tablets, powders, gels, and liquids.

5 9. The method of claim 1, where the harvested plant is incorporated into a processed food.

10. The method of claim 1, where the harvested plant is incorporated into a chemotherapeutic agent.

10 11. An isolated, edible plant which has been genetically engineered to accumulate more selenium in its edible portions than it would in nature.

12. An isolated, edible plant that has been induced, through exposure to an inducing agent, to contain methylselenocystine or selenium in its edible portions.

13. The plant of claim 12, where by the inducing agent is an organic acid.

14. The plant of claim 12, whereby the inducing agent is selected from the group consisting of citric acid, acetic acid, malic acid, salicylic acid and succinic acid.

15. The plant of claim 12, whereby the plant has been placed in contact with a soil environment to which metal has been added.

25 16. A nutritional supplement comprising the edible portions of a plant which has been induced to hyperaccumulate selenium in its edible portions, and which has been incorporated into any of a processed food, a capsule, a tablet, a powder, a gel, and a liquid.

17. The nutritional supplement of claim 16, whereby the plant is characterized by at least 400 parts per million dry weight of nutritionally valuable selenium in at least some of its edible portions.

5 18. The nutritional supplement of claim 17, whereby the inducing agent is an organic acid.

19. The nutritional supplement of claim 18, whereby the inducing agent is selected from the group consisting of citric acid, acetic acid, malic acid, salicylic acid and succinic acid.

10 20. The nutritional supplement of claim 16, whereby the plant is a member of the family Brassicaceae.

21. The nutritional supplement of claim 20, whereby the plant is of a species selected from the group consisting of *Brassica juncea*, *Brassica oleracea*, and *Brassica carinata*.

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22. ~~The method of claim 16, where the accumulated selenium is in the form of Se-methylselenocysteine.~~

23. An isolated, edible plant which is characterized by 400 parts per million dry weight of chemopreventive selenium in at least some of its edible portions.

24. The plant of claim 23, whereby the plant is a member of the family *Brassicaceae*.

25 25. The plant of claim 24, whereby the plant is of the species *Brassica juncea*, *Brassica Oleracea*, and *Brassica Carinata*.

26. A method of producing chemopreventive agents, comprising:  
identifying a growth environment containing selenite;  
contacting edible crop plant with the growth environment;

cultivating the plant in the growth environment under conditions and for a time sufficient for the plant to accumulate selenium into its edible portions; harvesting at least some edible portions of the plant which have accumulated selenium; and

incorporating the harvested portions of the plant into a nutritional supplement in a form selected from the group of a processed food, a chemotherapeutic agent, a capsule, a tablet, a powder, a gel and a liquid.

27. The method of claim 26, where the growth environment contains selenite.

28. The method of claim 26, where identifying the growth environment includes manipulating the growth environment to increase the availability of selenite to the plant.

29. The method of claim 26, where manipulating the growth environment includes adding selenite to the growth environment.

30. The method of claim 26, where the plant is a member of the family Brassicaceae.

31. The method of claim 30, where the plant is a member of the genus *Brassica*.

32. The method of claim, where the plant is a member of the species *Brassica juncea*, *Brassica Oleralea*, and *Brassica Carinata*

33. The method of claim 26, whereby the plant is genetically engineered to accumulate selenium.

34. The method of claim 33, whereby the selenium is accumulated in the form of Se-methylselenocysteine.

35. The method of claim 26, where the harvested plant comprises significant quantities of Se-methylselenocysteine.

36. The method of claim 26, where the genetically engineered plant accumulates more Se-methylselenocysteine in its edible portions than it would in nature.

37. A method of producing a genetically engineered plant capable of accumulating selenium, the method comprising:

identifying a plant in nature capable of accumulating selenium;

identifying the enzymes in that plant capable of accumulating selenium;

cloning the genes encoding the enzymes capable of accumulating selenium;

transforming the genes encoding the enzymes involved in accumulating selenium into an edible plant.

38. The method of claim 37, where the growth environment contains at least one of the group consisting of iron, zinc, manganese, chromium, selenium, vanadium, molybdenum, boron, titanium, and germanium.

39. The method of claim 37, where identifying the growth environment includes manipulating the growth environment to increase availability of metals to the plant.

40. The method of claim 39, where manipulating the growth environment includes adding at least one metal to the growth environment.

41. The method of claim 40, where the added metal comprises at least one of the group consisting of iron, zinc, manganese, chromium, and selenium.

42. The method of claim 37, whereby the plant is a member of the family Brassicaceae.

43. The method of claim 42, whereby the plant is of a species selected from the group consisting of *Brassica juncea*, *Brassica oleracea*, and *Brassica carinata*.

44. The method of claim 37, whereby cultivating the plant comprises exposing the  
5 plant to an inducing agent under conditions and for a time sufficient for the inducing agent to induce the plant to hyperaccumulate metal in its edible portions.

45. The method of claim 44, where the inducing agent is an organic acid.

10 46. The method of claim 45, where the organic acid is selected from the group consisting of citric acid, acetic acid, malic acid, salicylic acid and succinic acid.

47. The method of claim 37, where the harvested plant comprises nutritionally significant quantities of at least two metals.

48. A method of providing a nutritional supplement, comprising:  
providing a plant that contains Se-methylselenocystine or selenium in its edible  
portions; and incorporating the plant into a nutritional supplement.

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